WHAT IS CLAIMED IS:

1. A method for obtaining a polynucleotide that has a modulatory effect on an immune response, or encodes a polypeptide that has a modulatory effect on an immune response, that is induced by a genetic vaccine vector, the method comprising:

creating a library of recombinant polynucleotides; and

screening the library to identify an optimized recombinant polynucleotide that has, or encodes a polypeptide that has, a modulatory effect on an immune response induced by a genetic vaccine vector;

wherein the optimized recombinant polynucleotide or the polypeptide encoded by the recombinant polynucleotide exhibits an enhanced ability to modulate an immune response compared to a non-recombinant polynucleotide from which the library was created.

2. The method of claim 1, wherein the optimized recombinant polynucleotide is incorporated into a genetic vaccine vector.

3. The method of claim 1, wherein the optimized recombinant polynucleotide, or a polypeptide encoded by the optimized recombinant polynucleotide, is administered in conjunction with a genetic vaccine vector.

4. The method of claim 1, wherein the library of recombinant polynucleotides is created by a process selected from the group consisting of DNA shuffling, error-prone PCR, oligonucleotide-directed mutagenesis, uracil-mediated mutagenesis, and repair-deficient host mutagenesis.

5. The method of claim 1, wherein the polynucleotide that has a modulatory effect on an immune response is obtained by:

(1) recombining at least first and second forms of a nucleic acid that is, or encodes a molecule that is, involved in modulating an immune response, wherein the first and second forms differ from each other in two or more nucleotides, to produce a library of recombinant polynucleotides; and

(2) screening the library to identify at least one optimized recombinant polynucleotide that exhibits, either by itself or through the encoded molecule, an enhanced ability to modulate an immune response than a form of the nucleic acid from which the library was created.

6. The method of claim 5, wherein the method further comprises the steps of:

(3) recombining at least one optimized recombinant polynucleotide with a further form of the nucleic acid, which is the same or different from the first and second forms, to produce a further library of recombinant polynucleotides;

(4) screening the further library to identify at least one further optimized recombinant polynucleotide that exhibits an enhanced ability to modulate an immune response than a form of the nucleic acid from which the library was created.; and

(5) repeating (3) and (4), as necessary, until the further optimized recombinant polynucleotide exhibits an further enhanced ability to modulate an immune response than a form of the nucleic acid from which the library was created.

7. The method of ~~claim 1~~, wherein the optimized recombinant polynucleotide encodes a peptide or polypeptide that can interact with a cellular receptor involved in mediating an immune response, wherein the peptide or polypeptide acts as an agonist or antagonist of the receptor.

8. The method of claim 7, wherein the cellular receptor is a macrophage scavenger receptor.

9. The method of claim 7, wherein the cellular receptor is selected from the group consisting of a cytokine receptor and a chemokine receptor.

10. The method of claim 9, wherein the chemokine receptor is CCR6.

11. The method of claim 7, wherein the peptide or polypeptide mimics the activity of a natural ligand for the receptor but does not induce immune reactivity to the natural ligand.

12. The method of claim 7, wherein the library is screened by:

expressing the recombinant polynucleotides so that the encoded peptides or polypeptides are produced as fusions with a protein displayed on the surface of a replicable genetic package;

contacting the replicable genetic packages with a plurality of cells that display the receptor; and

identifying cells that exhibit a modulation of an immune response mediated by the receptor.

13. The method of claim 12, wherein the replicable genetic package is selected from the group consisting of a bacteriophage, a cell, a spore, and a virus.

14. The method of claim 13, wherein the replicable genetic package is an M13 bacteriophage and the protein is encoded by geneIII or geneVII.

15. The method of claim 7, which method further comprises introducing the optimized recombinant polynucleotide into a genetic vaccine vector and administering the vector to a mammal, wherein the peptide or polypeptide is expressed and acts as an agonist or antagonist of the receptor.

16. The method of claim 7, which method further comprises producing the peptide or polypeptide encoded by the optimized recombinant polynucleotide and introducing the peptide or polypeptide into a mammal in conjunction with a genetic vaccine vector.

17. The method of claim 7, wherein the optimized recombinant polynucleotide is inserted into an antigen-encoding nucleotide sequence of a genetic vaccine vector.

18. The method of claim 17, wherein the optimized recombinant polypeptide is introduced into a nucleotide sequence that encodes an M-loop of an HBsAg polypeptide.

19. The method of claim 1, wherein the optimized recombinant polynucleotide comprises a nucleotide sequence rich in unmethylated CpG.

20. The method of claim 1, wherein the optimized recombinant polynucleotide encodes a polypeptide that inhibits an allergic reaction.

21. The method of claim 20, wherein the polypeptide is selected from the group consisting of interferon-α, interferon-γ, IL-10, IL-12, an antagonist of IL-4, an antagonist of IL-5, and an antagonist of IL-13.

22. The method of 1, wherein the optimized recombinant polynucleotide encodes an antagonist of IL-10.

23. The method of claim 22, wherein the antagonist of IL-10 is soluble or defective IL-10 receptor or IL-20/MDA-7.

24. The method of claim 1, wherein the optimized recombinant polynucleotide encodes a costimulator.

25. The method of claim 24, wherein the costimulator is B7-1 (CD80) or B7-2 (CD86) and the screening step involves selecting variants with altered activity through CD28 or CTLA-4.

26. The method of claim 24, wherein the costimulator is CD1, CD40, CD154 (ligand for CD40) or CD150 (SLAM).

27. The method of claim 24, wherein the costimulator is a cytokine.

28. The method of claim 27, wherein the cytokine is selected from the group consisting of IL-1, IL-2, IL-3, IL-4, IL-5, IL-6, IL-7, IL-8, IL-9, IL-10, IL-11, IL-12, IL-13, IL-14, IL-15, IL-16, IL-17, IL-18, GM-CSF, G-CSF, TNF-α, IFN-α, IFN-γ, and IL-20 (MDA-7).

29. The method of 28, wherein the library of recombinant polynucleotides is screened by testing the ability of cytokines encoded by the recombinant polynucleotides to activate cells which contain a receptor for the cytokine.

30. The method of claim 29, wherein the cells contain a heterologous nucleic acid that encodes the receptor for the cytokine.

31. The method of 28, wherein the cytokine is interleukin-12 and the screening is performed by:

growing mammalian cells which contain the genetic vaccine vector in a culture medium; and

detecting whether T cell proliferation or T cell differentiation is induced by contact with the culture medium.

32. The method of 28, wherein the cytokine is interferon-α and the screening is performed by:

expressing the recombinant polynucleotides so that the encoded peptides or polypeptides are produced as fusions with a protein displayed on the surface of a replicable genetic package;

contacting the replicable genetic packages with a plurality of B cells; and

identifying phage library members that are capable of inhibiting proliferation of the B cells.

33. The method of claim 28, wherein the immune response of interest is differentiation of T cells to T_H1 cells and the screening is performed by contacting a

population of T cells with the cytokines encoded by the members of the library of recombinant polynucleotides and identifying library members that encode a cytokine that induces the T cells to produce IL-2 and interferon-γ.

34. The method of claim 27, wherein the cytokine encoded by the optimized recombinant polynucleotide exhibits reduced immunogenicity compared to a cytokine encoded by a non-optimized polynucleotide, and the reduced immunogenicity is detected by introducing a cytokine encoded by the recombinant polynucleotide into a mammal and determining whether an immune response is induced against the cytokine.

35. The method of claim 24, wherein the costimulator is B7-1 (CD80) or B7-2 (CD86) and the cell is tested for ability to costimulate an immune response.

36. The method of claim 1, wherein the optimized recombinant polynucleotide encodes a cytokine antagonist.

37. The method of claim 36, wherein the cytokine antagonist is selected from the group consisting of a soluble cytokine receptor and a transmembrane cytokine receptor having a defective signal sequence.

38. The method of claim 36, wherein the cytokine antagonist is selected from the group consisting of ΔIL-10R and ΔIL-4R.

39. The method of claim 1, wherein the optimized recombinant polynucleotide encodes a polypeptide capable of inducing a predominantly T_H1 immune response.

40. The method of claim 1, wherein the optimized recombinant polynucleotide encodes a polypeptide capable of inducing a predominantly T_H2 immune response.

41. A method for obtaining a polynucleotide that encodes an accessory molecule that improves the transport or presentation of antigens by a cell, the method comprising:

creating a library of recombinant polynucleotides by subjecting to recombination nucleic acids that encode all or part of the accessory molecule; and

screening the library to identify an optimized recombinant polynucleotide that encodes a recombinant accessory molecule that confers upon a cell an increased or decreased ability to transport or present an antigen on a surface of the cell compared to an accessory molecule encoded by the non-recombinant nucleic acids.

42. The method of claim 41, wherein the screening involves:

introducing the library of recombinant polynucleotides into a genetic vaccine vector that encodes an antigen to form a library of vectors;

introducing the library of vectors into mammalian cells; and

identifying mammalian cells that exhibit increased or decreased immunogenicity to the antigen.

43. The method of claim 41, wherein the accessory molecule comprises a proteasome or a TAP polypeptide.

44. The method of claim 41, wherein the accessory molecule comprises a cytotoxic T-cell inducing sequence.

45. The method of claim 44, wherein the cytotoxic T-cell inducing sequence is obtained from a hepatitis B surface antigen.

46. The method of claim 41, wherein the accessory molecule comprises an immunogenic agonist sequence.